

10. ASSERTION REASON BASED QUESTIONS:

Assertion (A): The domain of the function $\sec^{-1}2x$ is $(-\infty, -\frac{1}{2}] \cup [\frac{1}{2}, \infty)$

Reason (R): $\sec^{-1}(-2) = -\frac{\pi}{4}$

- a) Both A and R are true and R is the correct explanation of A.
- b) Both A and R are true and R is not the correct explanation of A.
- c) A is true but R is false.
- d) A is false but R is true.

SECTION- B

11. Prove that the Greatest Integer Function $f: \mathbb{R} \rightarrow \mathbb{R}$, given by $f(x) = [x]$, is neither one-one nor onto, where $[x]$ denotes the greatest integer less than or equal to x . [2]

12. Evaluate $\sin^{-1}(\sin\frac{3\pi}{4}) + \cos^{-1}(\cos\pi) + \tan^{-1}(1)$. [2]

13. Draw the graph of $\cos^{-1}x$, where $x \in [-1, 0]$. Also write its range. [2]

14. If A is invertible matrix of 3×3 and $|A| = 7$, then find $|A^{-1}|$. [2]

15. If $A = \begin{bmatrix} 2 & \lambda & -3 \\ 0 & 2 & 5 \\ 1 & 1 & 3 \end{bmatrix}$, then find the value of λ for which A^{-1} exists. [2]

SECTION - C

16. Find the simplest form of $\tan^{-1}\left(\frac{\sqrt{1+\cos x} + \sqrt{1-\cos x}}{\sqrt{1+\cos x} - \sqrt{1-\cos x}}\right)$, $\pi < x < \frac{3\pi}{2}$. [3]

17. Find the values of a, b, c and d if $\begin{bmatrix} a-b & 2a+c \\ 2a-b & 3c+d \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 0 & 13 \end{bmatrix}$. [3]

OR

If $x \begin{bmatrix} 2 \\ 3 \end{bmatrix} + y \begin{bmatrix} -1 \\ 1 \end{bmatrix} = \begin{bmatrix} 10 \\ 5 \end{bmatrix}$, find the value of x and y .

SECTION - D

18. Define the relation R in the set $N \times N$ as follows:

For $(a, b), (c, d) \in N \times N$, $(a, b) R (c, d)$ iff $ad = bc$. Prove that R is an equivalence relation in $N \times N$. [5]

OR

Given a non-empty set X , define the relation R in $P(X)$ as follows:

For $A, B \in P(X)$, $(A, B) \in R$ iff $A \subset B$. Prove that R is reflexive, transitive and not symmetric.

19. If $A = \begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$, find A^{-1} . Use A^{-1} to solve the following system of equations

$$2x - 3y + 5z = 11, 3x + 2y - 4z = -5, x + y - 2z = -3 \quad [5]$$

OR

If $A = \begin{bmatrix} -3 & -2 & -4 \\ 2 & 1 & 2 \\ 2 & 1 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 & 0 \\ -2 & -1 & -2 \\ 0 & -1 & 1 \end{bmatrix}$, then find AB and use it to solve the following system of equations:
 $x - 2y = 3, 2x - y - z = 2, -2y + z = 3$

SECTION- E

20. CASE STUDY BASED QUESTION:

Adarsh Tiwari, Anjali and Anushka (XII-A) were given the task of creating a square matrix of order 2.

Below are the 3 matrices created by them. A, B, C are the matrices created by Adarsh Tiwari, Anjali and Anushka respectively.

$$A = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix} B = \begin{bmatrix} 4 & 0 \\ 1 & 5 \end{bmatrix} C = \begin{bmatrix} 2 & 0 \\ 1 & -2 \end{bmatrix}$$

If $a = 4$ and $b = -2$, based on the above information answer the following:

- i). Find the value of $(bA)^T$. [2]
- ii). Find the value of $(a + b)B$. [2]